Listing of Claims:

1. (currently amended) A diaphragm valve comprising:

a valve body defining a valve passage having an inlet and an outlet;

a valve seat surrounding one of the inlet and the outlet, the valve seat having an annular seating surface extending radially from said one of the inlet and the outlet, and adjacent the valve passage;

a flexible diaphragm having first and second sides, the diaphragm positioned adjacent the valve passage opposite the valve seat with the first side facing toward the seating surface of the valve seat, the diaphragm operable in response to an applied actuation force to flex between an open position whereby the valve passage is at least partially open and a closed position whereby the first side of the diaphragm is pressed against the valve seat to thereby block the valve passage;

an enclosed space adjacent the second side of the diaphragm; and

a venting passage in communication with the enclosed space,

the seating surface being sized and shaped to contact a substantial portion of the first side of the diaphragm when the diaphragm is flexed to the closed position, thereby facilitating heat transfer between the valve seat and the diaphragm and inhibiting condensation on the first side of the diaphragm.

2. (original) A diaphragm valve according to claim 1 wherein the seating surface contacts between approximately 5% and 100% of the first side of the diaphragm when closed.

3. (original) A diaphragm valve according to claim 1 wherein the seating surface contacts between approximately 12% and 50% of the first side of the diaphragm when closed.

4. (original) A diaphragm valve according to claim 1 wherein the seating surface is characterized by an absence of sharp features, thereby preventing shearing of the diaphragm.

5. (original) A diaphragm valve according to claim 1 wherein the seating surface is polished, thereby improving heat transfer from the valve seat to the diaphragm when the first side of the diaphragm is pressed against the valve seat.

6. (original) A diaphragm valve according to claim 1 wherein the seating surface is crowned.

7. (currently amended) A diaphragm valve comprising:

a valve body defining a valve passage having an inlet and an outlet;

a valve seat surrounding one of the inlet and the outlet, the valve seat having an annular seating surface extending radially from said one of the inlet and the outlet, and adjacent the valve passage; and

a flexible diaphragm having first and second sides, the diaphragm positioned adjacent the valve passage opposite the valve seat with the first side facing toward the seating surface of the valve seat, the diaphragm operable in response to an applied actuation force to flex between an open position whereby the valve passage is at least partially open and a closed position whereby the first side of the diaphragm is pressed against the valve seat to thereby block the valve passage,

the valve seat including a seating ridge surrounding said one of the inlet and the outlet, and extending from the seating surface toward the diaphragm.

8. (original) A diaphragm valve according to claim 7 wherein the seating ridge extends from the seating surface to a height of between approximately 0.5 mm and 1.5 mm.

9. (original) A diaphragm valve according to claim 7 wherein the diaphragm is comprised of a plastic material.

10. (original) A diaphragm valve according to claim 1 wherein the diaphragm is comprised of an elastomeric material.

11. (currently amended) A diaphragm valve comprising:

a valve body defining a valve passage having an inlet and an outlet;

a valve seat surrounding one of the inlet and the outlet, the valve seat having an annular seating surface extending radially from said one of the inlet and the outlet, and adjacent the valve passage;

a flexible diaphragm having first and second sides, the diaphragm positioned adjacent the valve passage opposite the valve seat with the first side facing toward the seating surface of the valve seat, the diaphragm operable in response to an applied actuation force to flex between an open position whereby the valve passage is at least partially open and a closed position whereby the first side of the diaphragm is pressed against the valve seat to thereby block the valve passage; and

a spacer ring interposed between the valve seat and the valve body to establish an axial position of the seating surface relative to the valve body.

12. (original) A diaphragm valve according to claim 1 wherein the seating surface is bounded by an outer peripheral edge and sized so that the diaphragm does not contact

the outer peripheral edge of the seating surface when the diaphragm is flexed to the closed position.

13. (original) A diaphragm valve according to claim 1 further comprising a protective coating over the first side of the diaphragm.

14. (original) A diaphragm valve according to claim 13 wherein the protective coating is selected from the group consisting of an oxide, a nitride, a carbide, and mixtures thereof.

15. (original) A diaphragm valve according to claim 1 further comprising a protective coating lining the valve passage.

16. (original) A diaphragm valve according to claim 15 wherein the protective coating is selected from the group consisting of an oxide, a nitride, a carbide, and mixtures thereof.

17. (original) A diaphragm valve according to claim 1 further comprising a protective coating over the seating surface of the valve seat.

18. (original) A diaphragm valve according to claim 17 wherein the protective coating is selected from the group consisting of an oxide, a nitride, a carbide, and mixtures thereof.

19. (original) A diaphragm valve according to claim 1 further comprising an actuator for driving the diaphragm, the actuator including a movable plunger, a stop positioned to limit the movement of the plunger, and a protective blocking member interposed between the plunger and the stop.

20. (original) A diaphragm valve according to claim 19 wherein the blocking member is comprised of a durable plastic material that cushions impact of the plunger against the stop to thereby prevent cracking of the stop and the plunger.

21. (original) A diaphragm valve according to claim 19 wherein the blocking member is comprised of polytetrafluoroethylene.

22. (original) A diaphragm valve according to claim 1 further comprising:

a solenoid and a movable plunger operable to drive the diaphragm; and

a slide bushing interposed between the plunger and the solenoid.

23. (cancelled)

24. (currently amended) In combination with the diaphragm valve of claim 1, a pump operably coupled to the venting passage for reducing a fluid pressure in the enclosed space.

25. (currently amended) A diaphragm valve comprising:

a valve body defining a valve passage having an inlet and an outlet;

a valve seat surrounding one of the inlet and the outlet, the valve seat having an annular seating surface extending radially from said one of the inlet and the outlet, and adjacent the valve passage;

a flexible diaphragm having first and second sides, the diaphragm positioned adjacent the valve passage opposite the valve seat with the first side facing toward the seating surface of the valve seat, the diaphragm operable in response to an applied actuation force to flex between an open position whereby the valve passage is at least partially open and a closed position whereby a substantial portion of the first side of the diaphragm is pressed against the valve seat to thereby block the valve passage and facilitate heat transfer between the valve seat and the diaphragm; and

a heating body thermally contacting the valve body and extending proximal to the second side of the diaphragm thereby forming a thermally conductive pathway that facilitates maintaining an operating temperature at the diaphragm.

26. (original) In combination with a diaphragm valve according to claim 25, a heater in thermal association with the valve body, the heater adapted to generate heat that is conducted through the valve body and the heating body to thereby prevent a medium in the valve passage from condensing or freezing in the valve passage.

27. (original) A diaphragm valve according to claim 25 further comprising:

an actuator for driving the diaphragm; and

a thermally resistive member interposed between the valve passage and the actuator for attenuating heat transfer between the valve passage and the actuator.

28. (original) A diaphragm valve according to claim 1 further comprising a spring for biasing the diaphragm toward one of the open and closed positions and an actuator operably engaged with the diaphragm for driving the diaphragm in a direction opposite the spring.

29. (original) A diaphragm valve according to claim 28 wherein:

the actuator includes a solenoid and a movable plunger;

the spring biases the diaphragm toward the closed position; and

the plunger is driven to oppose the spring and move the diaphragm to the open position in response to energizing of the solenoid coil.

30. (original) A diaphragm valve according to claim 1 further comprising means contacting the valve body for conducting heat from the valve body toward the second side of the diaphragm to facilitate maintaining an operating temperature at the diaphragm.

31. (original) In combination with a diaphragm valve according to claim 1, means for heating a medium in the valve passage to thereby prevent the medium from condensing or freezing in the valve passage.

32. (currently amended) A diaphragm valve comprising:

a valve body defining a valve passage having an inlet and an outlet;

a valve seat surrounding one of the inlet and the outlet, the valve seat having an annular seating surface extending radially from said one of the inlet and the outlet, and adjacent the valve passage;

a flexible diaphragm having first and second sides, the diaphragm positioned adjacent the valve passage opposite the valve seat with the first side facing toward the seating surface of the valve seat, the diaphragm operable in response to an applied actuation force to flex between an open position whereby the valve passage is at least partially open and a closed position whereby a substantial portion of the first side of the diaphragm is pressed against the valve seat to thereby block the valve passage and facilitate heat transfer between the valve seat and the diaphragm;

means for actuating the diaphragm; and

means for attenuating heat transfer between the valve passage and the means for actuating.

33. (original) A diaphragm valve according to claim 32 wherein the means for actuating includes a solenoid.

34. (cancelled)

35. (original) In combination with a diaphragm valve according to claim 1, means for drawing a vacuum in the enclosed space.

36. (currently amended) A diaphragm valve comprising:

a valve body defining a valve passage having an inlet and an outlet;

a valve seat surrounding one of the inlet and the outlet, the valve seat having an annular seating surface extending radially from said one of the inlet and the outlet, and adjacent the valve passage;

a flexible diaphragm having first and second sides, the diaphragm positioned adjacent the valve passage opposite the valve seat with the first side facing toward the seating surface of the valve seat, the diaphragm operable in response to an applied actuation force to flex between an open position whereby the valve passage is at least partially open and a closed position whereby a substantial portion of the first side of the

diaphragm is pressed against the valve seat to thereby block the valve passage and facilitate heat transfer between the valve seat and the diaphragm; and

means for reducing a fluid pressure on the second side of the diaphragm.

37. (currently amended) A precursor material delivery system including a diaphragm valve comprising:

a valve body defining a valve passage having an inlet and an outlet;

a valve seat surrounding one of the inlet and the outlet, the valve seat having an annular seating surface extending radially from said one of the inlet and the outlet, and adjacent the valve passage; and

a flexible diaphragm having first and second sides, the diaphragm positioned adjacent the valve passage opposite the valve seat with the first side facing toward the seating surface of the valve seat, the diaphragm operable in response to an applied actuation force to flex between an open position whereby the valve passage is at least partially open and a closed position whereby a substantial portion of the first side of the diaphragm is pressed against the valve seat to thereby block the valve passage and facilitate heat transfer between the valve seat and the diaphragm.

38. (currently amended) A precursor material delivery system according to claim 37, further comprising a heater in thermal association with the valve body.

39. (currently amended) An ALD reactor including a diaphragm valve comprising:

a valve body defining a valve passage having an inlet and an outlet;

a valve seat surrounding one of the inlet and the outlet, the valve seat having an annular seating surface extending radially from said one of the inlet and the outlet, and adjacent the valve passage; and

a flexible diaphragm having first and second sides, the diaphragm positioned adjacent the valve passage opposite the valve seat with the first side facing toward the seating surface of the valve seat, the diaphragm operable in response to an applied actuation force to flex between an open position whereby the valve passage is at least partially open and a closed position whereby a substantial portion of the first side of the diaphragm is pressed against the valve seat to thereby block the valve passage and facilitate heat transfer between the valve seat and the diaphragm.

40. (currently amended) An ALD reactor according to claim 39, further comprising:

an enclosed space adjacent the second side of the diaphragm;

a venting passage in communication with the enclosed space; and

a pump operably coupled to the venting passage for reducing a fluid pressure in the enclosed space.

41. (new) An ALD reactor according to claim 40 wherein the venting passage extends through the valve body.

42. (new) A diaphragm valve according to claim 1 wherein the venting passage extends through the valve body.

43. (new) A diaphragm valve according to claim 1 wherein the diaphragm is comprised of a plastic material.

44. (new) A diaphragm valve according to claim 7 wherein the seating ridge is sufficiently tall and sharp so that the first side of the diaphragm is permanently deformed over the seating ridge in response to pressing of the diaphragm against the valve seat.

45. (new) A diaphragm valve according to claim 7 wherein the first side of the diaphragm is deformed over the seating ridge in response to pressing of the diaphragm against the valve seat, and the seating ridge is short enough to allow a substantial portion of the first side of the diaphragm to be pressed against the seating surface when the first side of the diaphragm is deformed over the seating ridge.

46. (new) A diaphragm valve according to claim 11 wherein the seating surface is polished, thereby improving heat transfer from the valve seat to the diaphragm when the first side of the diaphragm is pressed against the valve seat.

47. (new) A diaphragm valve according to claim 11 wherein the diaphragm is comprised of a plastic material.

48. (new) A diaphragm valve according to claim 25 wherein the diaphragm is comprised of a plastic material.

49. (new) A diaphragm valve according to claim 32 wherein the diaphragm is comprised of a plastic material.

50. (new) A precursor material delivery system according to claim 37 wherein the seating surface of the diaphragm valve contacts between approximately 5% and 100% of the first side of the diaphragm when closed.

51. (new) A precursor material delivery system according to claim 37 wherein the seating surface of the diaphragm valve contacts between approximately 12% and 50% of the first side of the diaphragm when closed.

52. (new) A precursor material delivery system according to claim 37 wherein the seating surface of the diaphragm valve is characterized by an absence of sharp features, thereby preventing shearing of the diaphragm.

53. (new) A precursor material delivery system according to claim 37 wherein the seating surface is polished, thereby improving heat transfer from the valve seat to the diaphragm when the first side of the diaphragm is pressed against the valve seat.

54. (new) A precursor material delivery system according to claim 37 wherein the valve seat includes a seating ridge surrounding said one of the inlet and the outlet, and extending from the seating surface toward the diaphragm.

55. (new) A precursor material delivery system according to claim 37 wherein the diaphragm of the diaphragm valve is comprised of a plastic material.

56. (new) A precursor material delivery system according to claim 37 further comprising a spacer ring interposed between the valve seat and the valve body to establish an axial position of the seating surface relative to the valve body.

57. (new) A precursor material delivery system according to claim 37 further comprising a protective coating over the first side of the diaphragm.

58. (new) A precursor material delivery system according to claim 57 wherein the protective coating is selected from the group consisting of an oxide, a nitride, a carbide, and mixtures thereof.

59. (new) A precursor material delivery system according to claim 37 further comprising a protective coating lining the valve passage.

60. (new) A precursor material delivery system according to claim 59 wherein the protective coating is selected from the group consisting of an oxide, a nitride, a carbide, and mixtures thereof.

61. (new) A precursor material delivery system according to claim 37 further comprising a protective coating over the seating surface of the valve seat.

62. (new) A precursor material delivery system according to claim 61 wherein the protective coating is selected from the group consisting of an oxide, a nitride, a carbide, and mixtures thereof.

63. (new) An ALD reactor according to claim 39 wherein the seating surface of the diaphragm valve contacts between approximately 5% and 100% of the first side of the diaphragm when closed.

64. (new) An ALD reactor according to claim 39 wherein the seating surface of the diaphragm valve contacts between approximately 12% and 50% of the first side of the diaphragm when closed.

65. (new) An ALD reactor according to claim 39 wherein the seating surface of the diaphragm valve is characterized by an absence of sharp features, thereby preventing shearing of the diaphragm.

66. (new) An ALD reactor according to claim 39 wherein the valve seat includes a seating ridge surrounding said one of the inlet and the outlet, and extending from the seating surface toward the diaphragm.

67. (new) An ALD reactor according to claim 39 wherein the diaphragm of the diaphragm valve is comprised of a plastic material.

68. (new) An ALD reactor according to claim 39 further comprising a spacer ring interposed between the valve seat and the valve body to establish an axial position of the seating surface relative to the valve body.